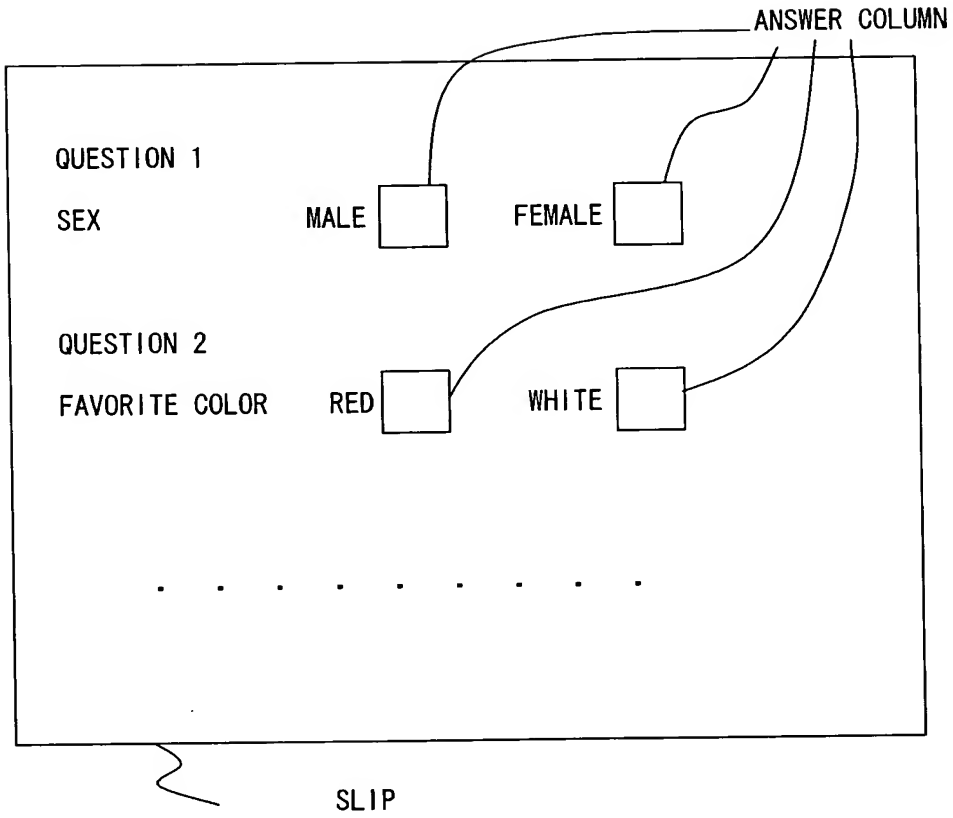


FIG. 1 (RELATED ART)

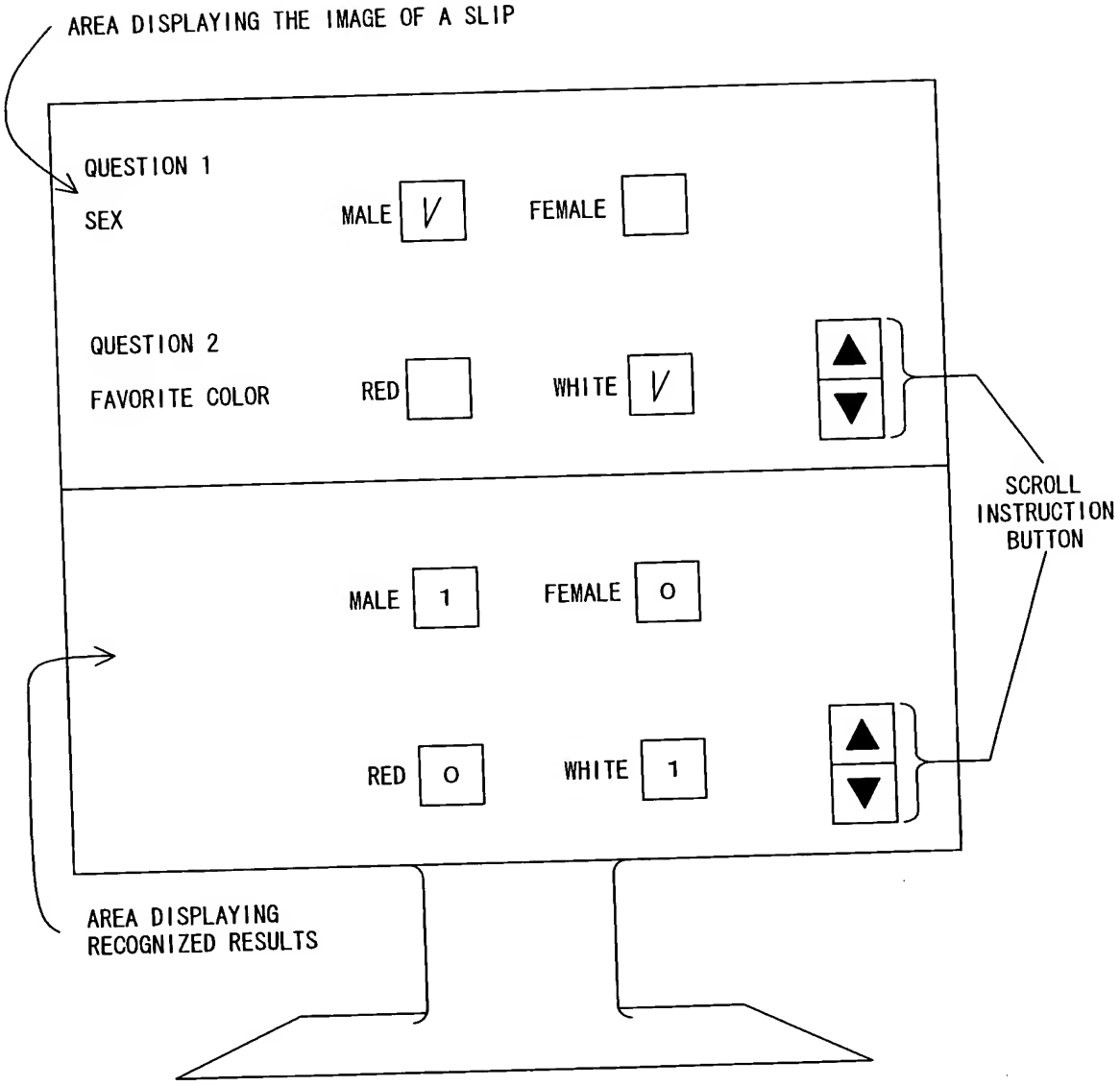


FIG. 2 (RELATED ART)

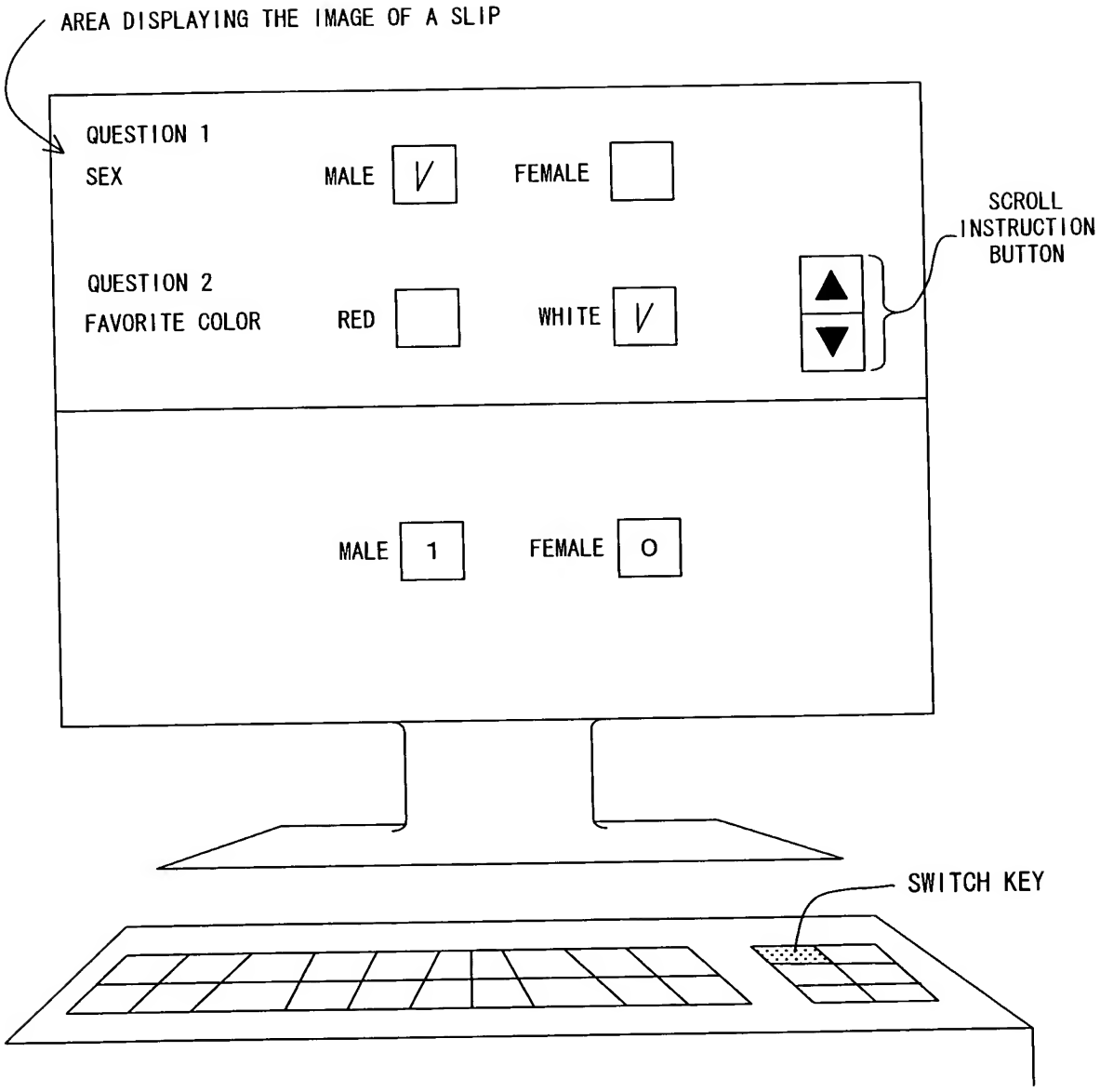


FIG. 3 (RELATED ART)

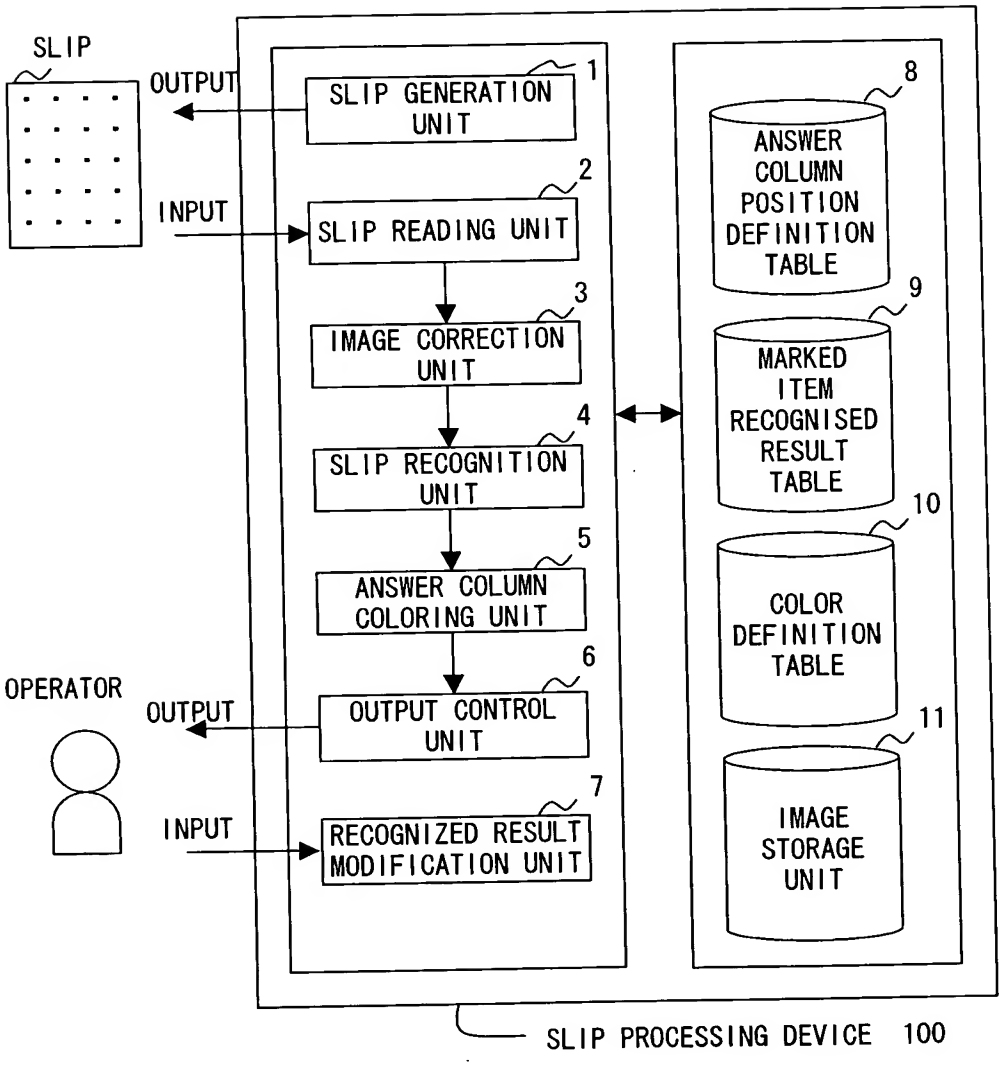

SLIP
OUTPUT
INPUT
OPERATOR
OUTPUT
INPUT
SLIP GENERATION UNIT
1
SLIP READING UNIT
2
IMAGE CORRECTION UNIT
3
SLIP RECOGNITION UNIT
4
ANSWER COLUMN COLORING UNIT
5
OUTPUT CONTROL UNIT
6
RECOGNIZED RESULT MODIFICATION UNIT
7
ANSWER COLUMN POSITION DEFINITION TABLE
8
MARKED ITEM RECOGNISED RESULT TABLE
9
COLOR DEFINITION TABLE
10
IMAGE STORAGE UNIT
11
SLIP PROCESSING DEVICE 100

FIG. 4

ANSWER COLUMN POSITION DEFINITION TABLE

	START X-COORDINATE	START Y-COORDINATE		END X-COORDINATE	END Y-COORDINATE
QUESTION 1	10	15		50	20
MALE	20	15		25	20
FEMALE	30	15		35	20
QUESTION 2	10	30		50	35
RED	20	30		25	35
WHITE	30	30		35	35
. . .	. . .	. . .		. . .	. . .

FIG. 5

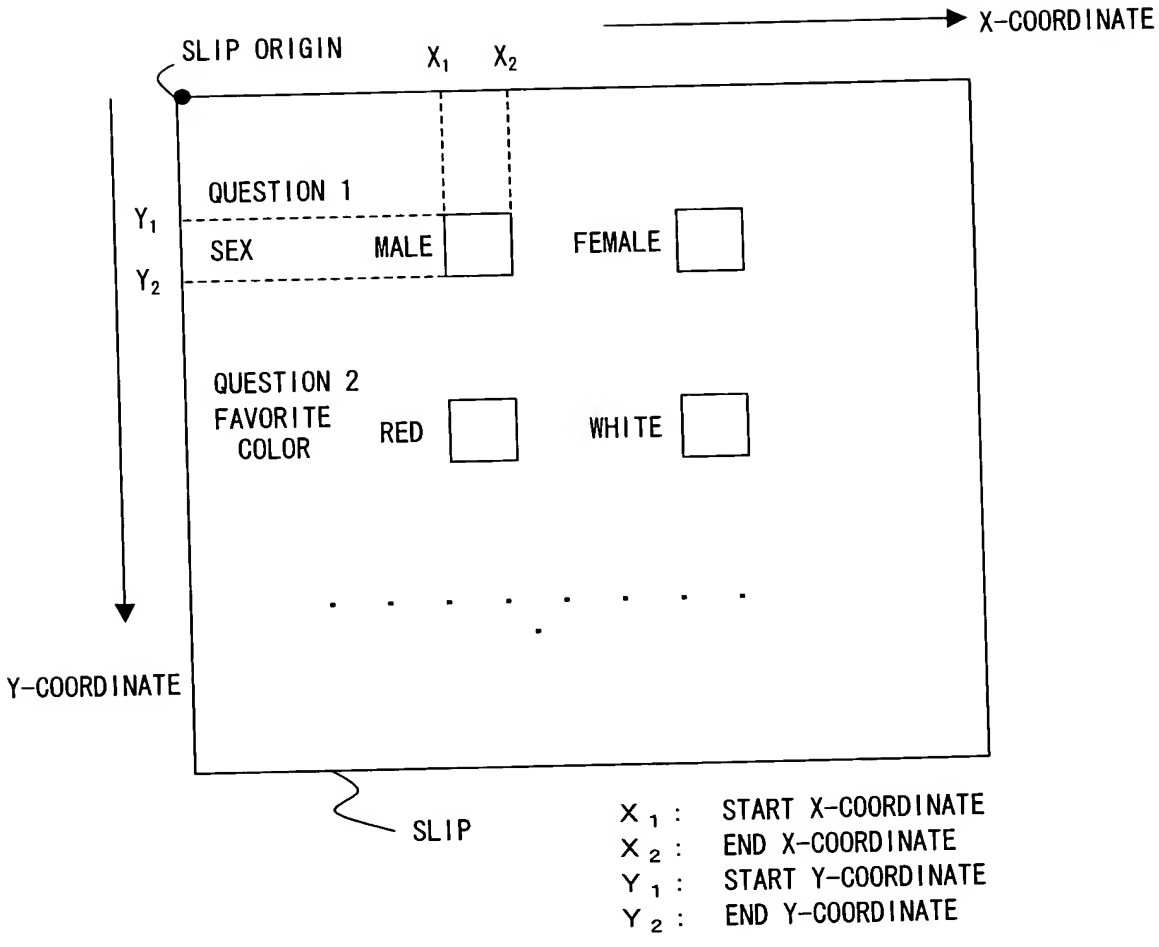

X-COORDINATE
SLIP ORIGIN
X1
X2
QUESTION 1
Y1
SEX
MALE
FEMALE
Y2
QUESTION 2
FAVORITE COLOR
RED
WHITE
Y-COORDINATE
SLIP
X1 : START X-COORDINATE
X2 : END X-COORDINATE
Y1 : START Y-COORDINATE
Y2 : END Y-COORDINATE

FIG. 6

MARKED ITEM RECOGNIZED RESULT TABLE

MALE	1
FEMALE	0
RED	0
WHITE	1
. . .	. . .

FIG. 7

COLOR DEFINITION TABLE

RECOGNIZED RESULT INFORMATION	COLOR
1	RED
0	BLUE
2	GREEN

FIG. 8

DESIGN OF A SLIP
A SLIP IS GENERATED ON A SCREEN

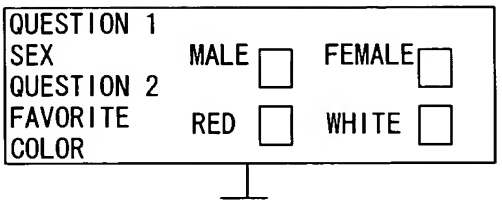


FIG. 9A

PRINTS THE SLIP

SLIP

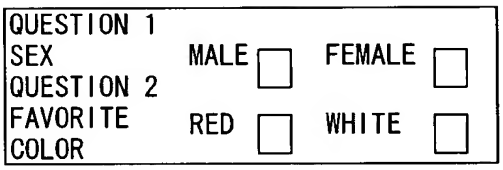


FIG. 9B

THE POSITION OF QUESTIONS AND ANSWER COLUMNS ARE STORED IN THE ANSWER COLUMN POSITION DEFINITION TABLE

ANSWER COLUMN DEFINITION TABLE

	START X-COORDINATE	START Y-COORDINATE	END X-COORDINATE	END Y-COORDINATE
QUESTION 1	10	15	50	20
MALE	20	15	25	20
FEMALE	30	15	35	20
QUESTION 2	10	30	50	35
RED	20	30	25	35
WHITE	30	30	35	35

FIG. 9C

SLIP READING AND MARK RECOGNITION

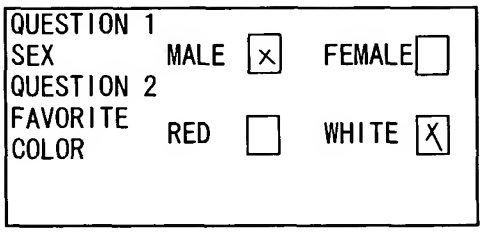


FIG. 10A

THE RECOGNIZED RESULTS OF ITEMS ARE STORED IN A TABLE

MARKED ITEM RECOGNIZED RESULT TABLE

MALE	1
FEMALE	0
RED	0
WHITE	1

FIG. 10B

THE CHECK SCREEN IS DISPLAYED

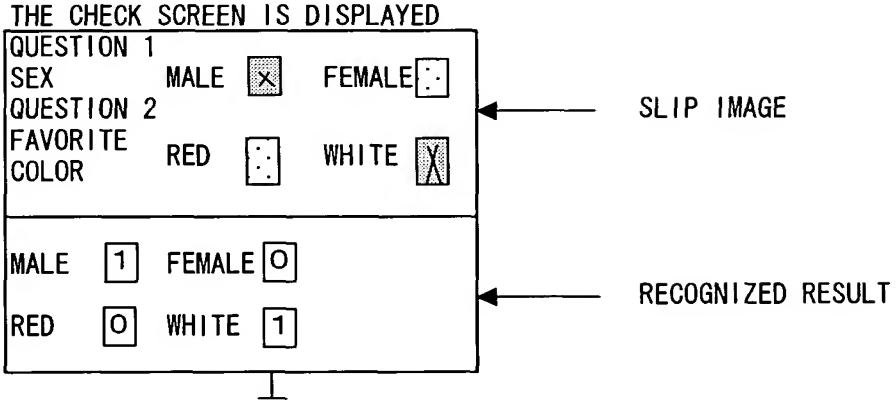


FIG. 10C

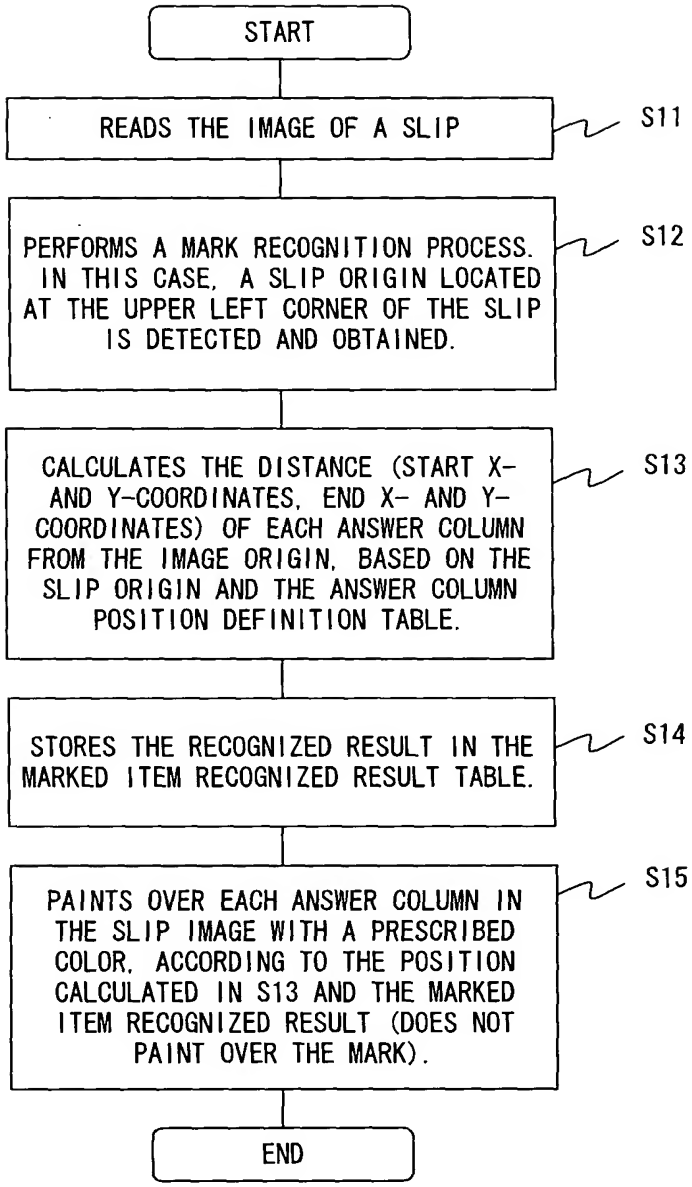

START
READS THE IMAGE OF A SLIP
S11
PERFORMS A MARK RECOGNITION PROCESS. IN THIS CASE, A SLIP ORIGIN LOCATED AT THE UPPER LEFT CORNER OF THE SLIP IS DETECTED AND OBTAINED.
S12
CALCULATES THE DISTANCE (START X- AND Y-COORDINATES, END X- AND Y-COORDINATES) OF EACH ANSWER COLUMN FROM THE IMAGE ORIGIN, BASED ON THE SLIP ORIGIN AND THE ANSWER COLUMN POSITION DEFINITION TABLE.
S13
STORES THE RECOGNIZED RESULT IN THE MARKED ITEM RECOGNIZED RESULT TABLE.
S14
PAINTS OVER EACH ANSWER COLUMN IN THE SLIP IMAGE WITH A PRESCRIBED COLOR, ACCORDING TO THE POSITION CALCULATED IN S13 AND THE MARKED ITEM RECOGNIZED RESULT (DOES NOT PAINT OVER THE MARK).
S15
END

FIG. 11

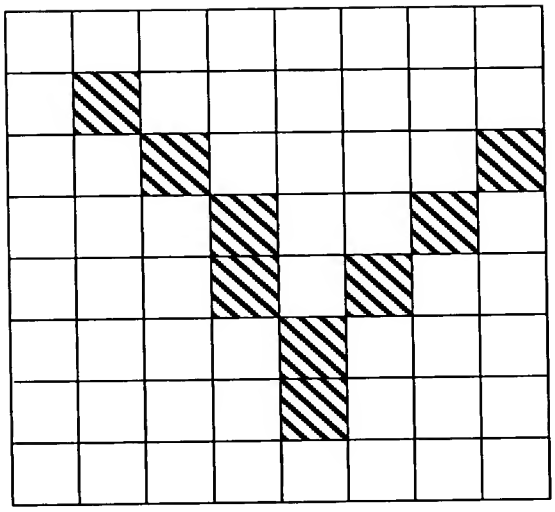


FIG. 12

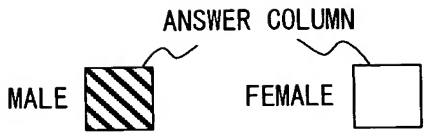


FIG. 13A

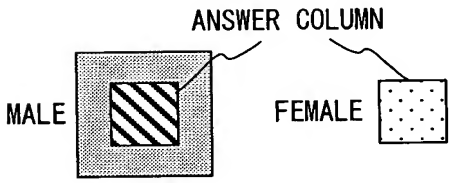


FIG. 13B

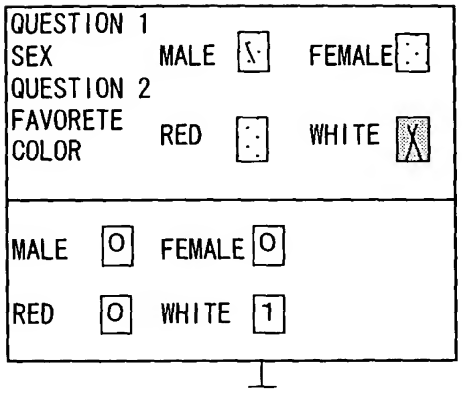


FIG. 14A

MARKED ITEM RECOGNIZED RESULT TABLE

MALE	0
FEMALE	0
RED	0
WHITE	1

FIG. 14B

AN ANSWER COLUMN OF THE IMAGE DATA OR A FIELD OF THE RECOGNIZED RESULT IS SELECTED (IN FIG. 14A, AN ANSWER COLUMN CORRESPONDING TO AN ITEM "MALE" OR A FIELD OF THE RECOGNIZED RESULT IS SELECTED).

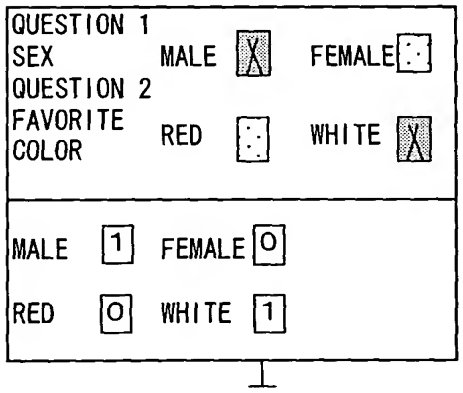


FIG. 14C

MARKED ITEM RECOGNIZED RESULT TABLE

MALE	1
FEMALE	0
RED	0
WHITE	1

FIG. 14D

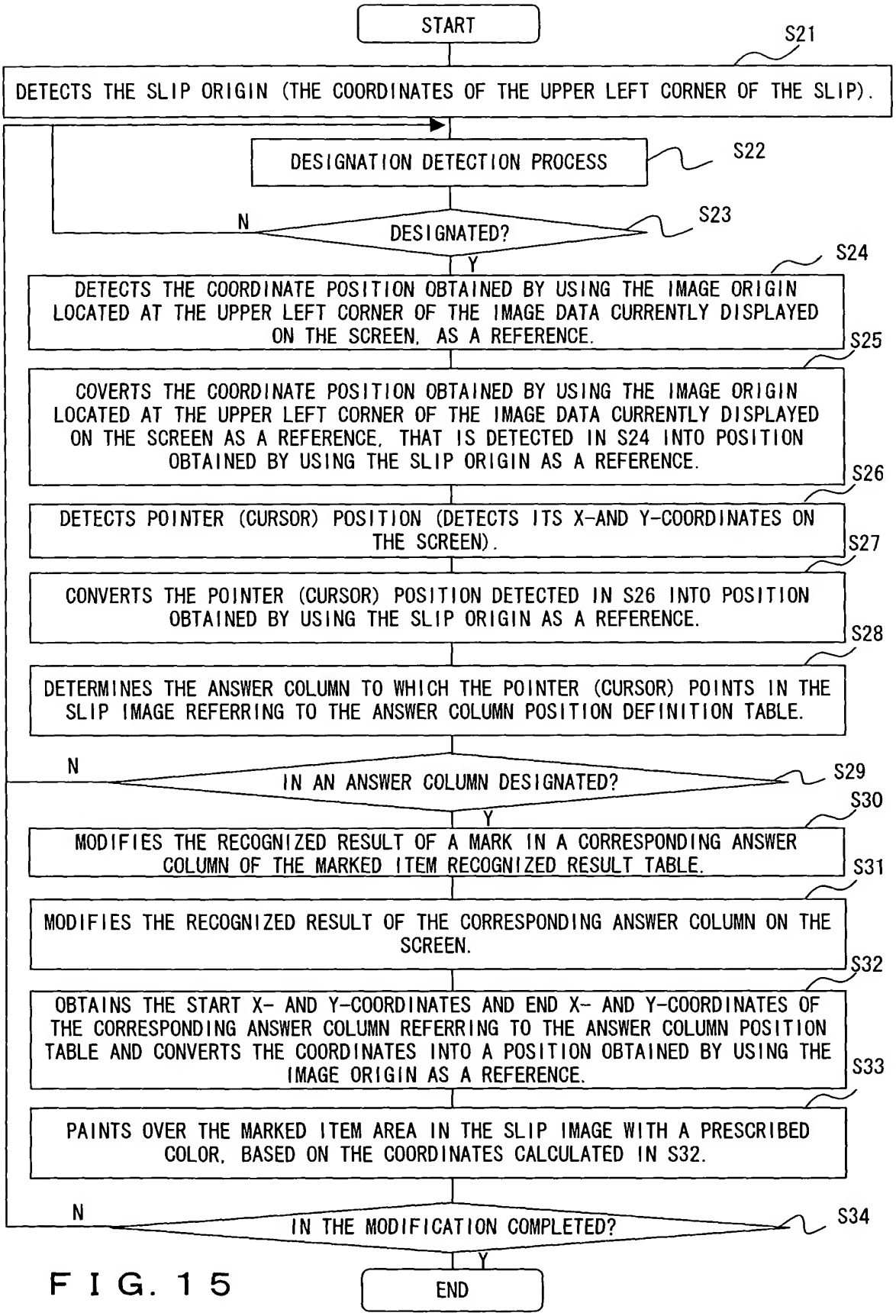

START
S21
DETECTS THE SLIP ORIGIN (THE COORDINATES OF THE UPPER LEFT CORNER OF THE SLIP).
DESIGNATION DETECTION PROCESS
S22
N
DESIGNATED?
S23
Y
S24
DETECTS THE COORDINATE POSITION OBTAINED BY USING THE IMAGE ORIGIN LOCATED AT THE UPPER LEFT CORNER OF THE IMAGE DATA CURRENTLY DISPLAYED ON THE SCREEN, AS A REFERENCE.
S25
COVERTS THE COORDINATE POSITION OBTAINED BY USING THE IMAGE ORIGIN LOCATED AT THE UPPER LEFT CORNER OF THE IMAGE DATA CURRENTLY DISPLAYED ON THE SCREEN AS A REFERENCE, THAT IS DETECTED IN S24 INTO POSITION OBTAINED BY USING THE SLIP ORIGIN AS A REFERENCE.
S26
DETECTS POINTER (CURSOR) POSITION (DETECTS ITS X-AND Y-COORDINATES ON THE SCREEN).
S27
CONVERTS THE POINTER (CURSOR) POSITION DETECTED IN S26 INTO POSITION OBTAINED BY USING THE SLIP ORIGIN AS A REFERENCE.
S28
DETERMINES THE ANSWER COLUMN TO WHICH THE POINTER (CURSOR) POINTS IN THE SLIP IMAGE REFERRING TO THE ANSWER COLUMN POSITION DEFINITION TABLE.
N
IN AN ANSWER COLUMN DESIGNATED?
S29
Y
S30
MODIFIES THE RECOGNIZED RESULT OF A MARK IN A CORRESPONDING ANSWER COLUMN OF THE MARKED ITEM RECOGNIZED RESULT TABLE.
S31
MODIFIES THE RECOGNIZED RESULT OF THE CORRESPONDING ANSWER COLUMN ON THE SCREEN.
S32
OBTAINS THE START X- AND Y-COORDINATES AND END X- AND Y-COORDINATES OF THE CORRESPONDING ANSWER COLUMN REFERRING TO THE ANSWER COLUMN POSITION TABLE AND CONVERTS THE COORDINATES INTO A POSITION OBTAINED BY USING THE IMAGE ORIGIN AS A REFERENCE.
S33
PAINTS OVER THE MARKED ITEM AREA IN THE SLIP IMAGE WITH A PRESCRIBED COLOR, BASED ON THE COORDINATES CALCULATED IN S32.
N
IN THE MODIFICATION COMPLETED?
S34
Y
END

FIG. 15

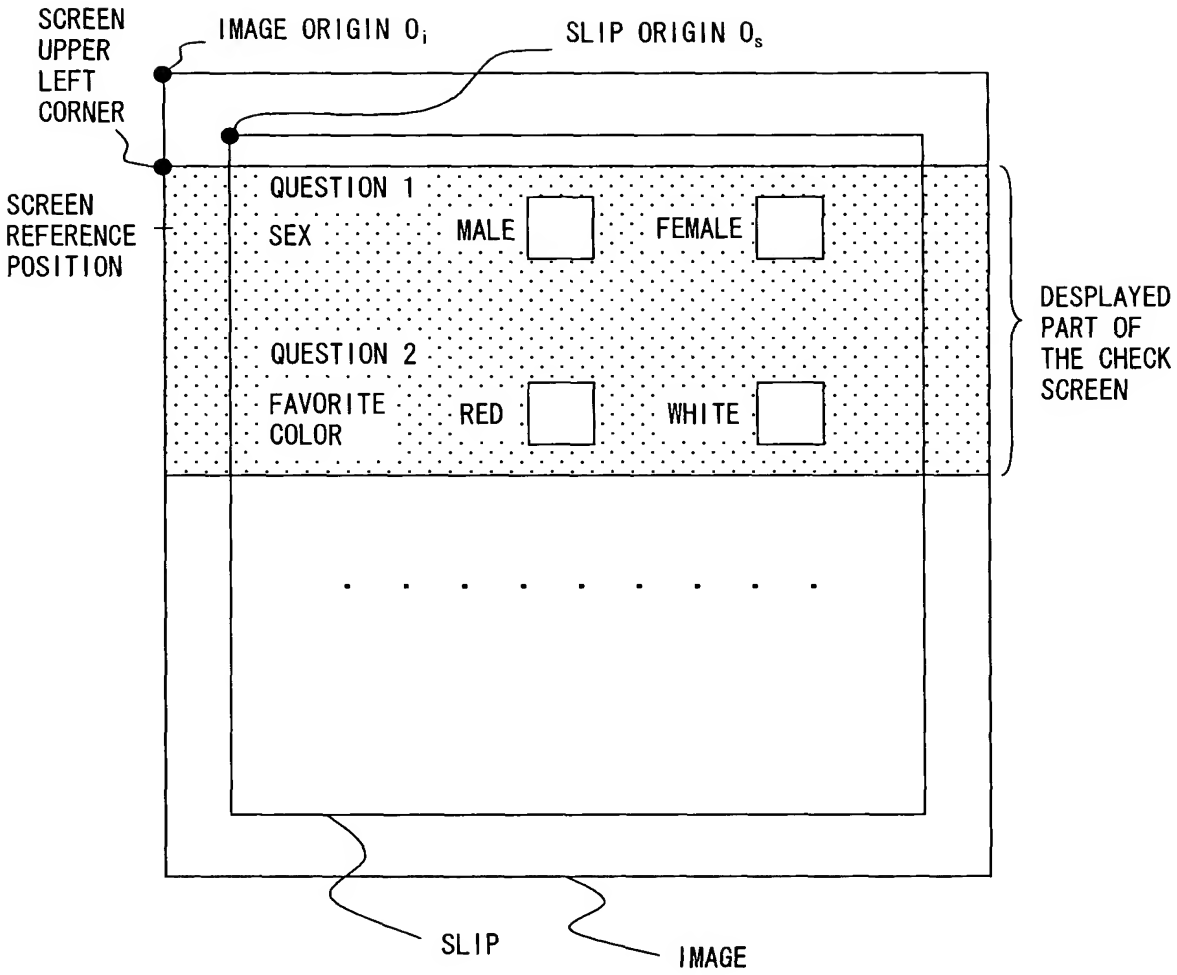

SCREEN
UPPER
LEFT
CORNER
IMAGE ORIGIN O_i
SLIP ORIGIN O_s
SCREEN
REFERENCE
POSITION
QUESTION 1
SEX
MALE
FEMALE
QUESTION 2
FAVORITE
COLOR
RED
WHITE
DESPLAYED
PART OF
THE CHECK
SCREEN
SLIP
IMAGE

FIG. 16

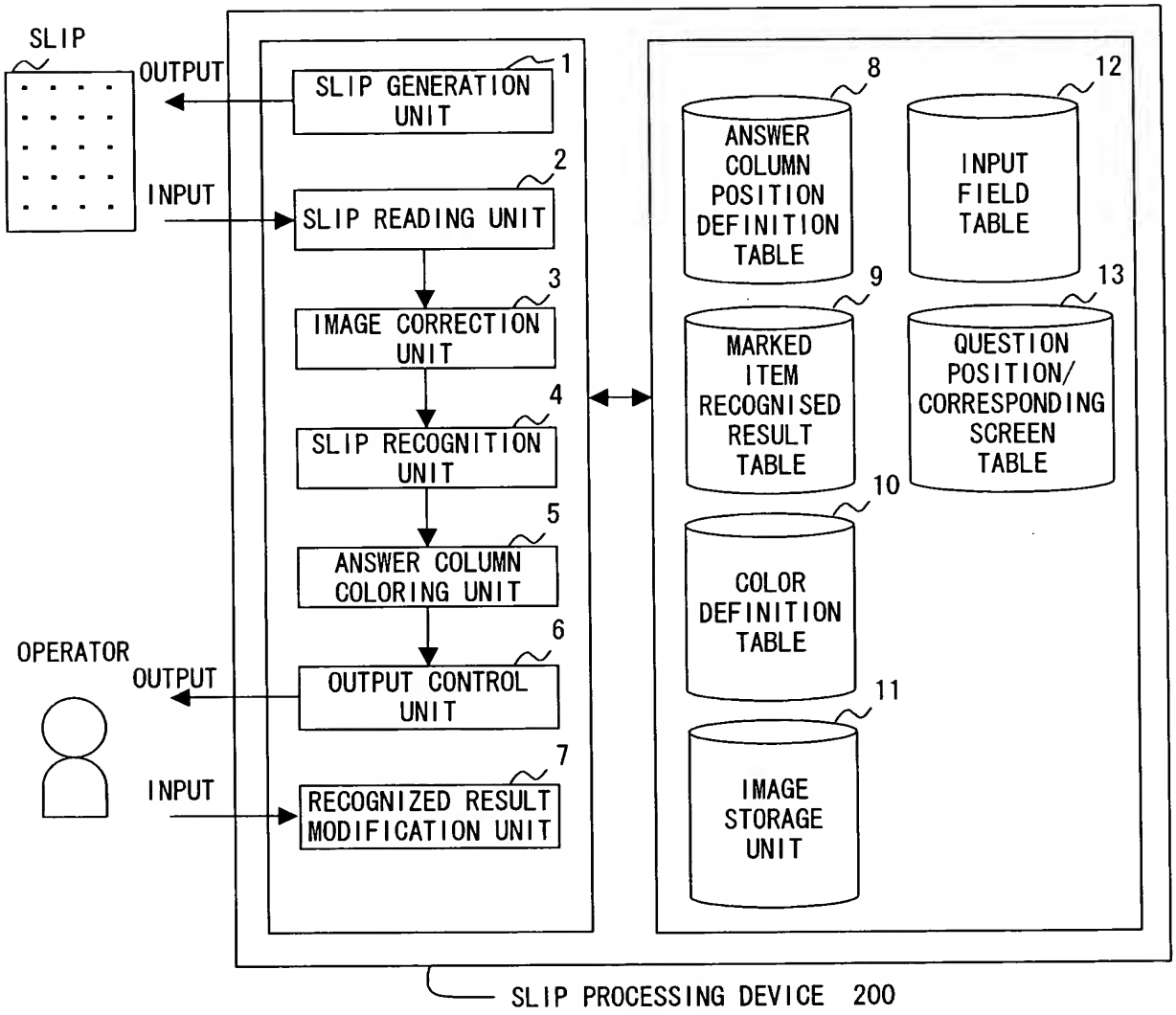

SLIP
OUTPUT
INPUT
OPERATOR
OUTPUT
INPUT
SLIP GENERATION UNIT
1
SLIP READING UNIT
2
IMAGE CORRECTION UNIT
3
SLIP RECOGNITION UNIT
4
ANSWER COLUMN COLORING UNIT
5
OUTPUT CONTROL UNIT
6
RECOGNIZED RESULT MODIFICATION UNIT
7
ANSWER COLUMN POSITION DEFINITION TABLE
8
MARKED ITEM RECOGNISED RESULT TABLE
9
COLOR DEFINITION TABLE
10
IMAGE STORAGE UNIT
11
INPUT FIELD TABLE
12
QUESTION POSITION/ CORRESPONDING SCREEN TABLE
13
SLIP PROCESSING DEVICE 200

FIG. 17

QUESTION POSITION / CORRESPONDING SCREEN TABLE 13

	START Y-COORDINATE	END Y-COORDINATE	SCREEN NAME
QUESTION 1	15	20	A
QUESTION 2	30	35	B
. . .	. . .	. . .	. . .

FIG. 18

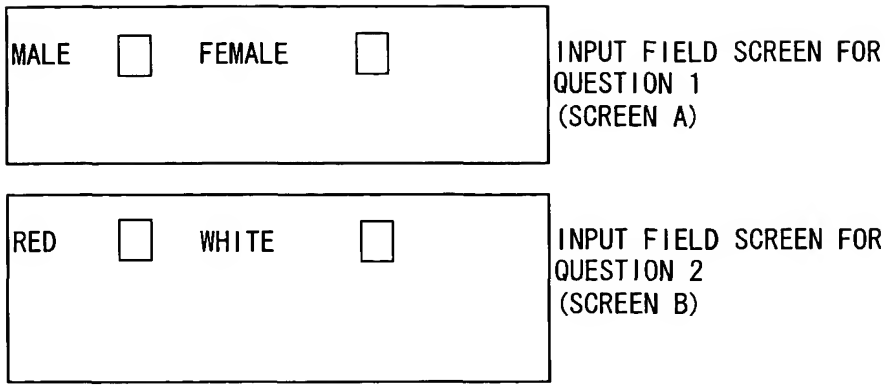


FIG. 19A

GENERATION OF A CORRESPONDENCE TABLE BETWEEN THE INPUT FIELD SCREEN AND THE DISPLAYED IMAGE POSITION

THE FOLLOWING TABLE IS GENERATED BASED ON THE POSITION DEFINITION INFORMATION STORED IN THE ANSWER COLUMN POSITION DEFINITION TABLE.

QUESTION POSITION/CORRESPONDING SCREEN TABLE

	START Y-COORDINATE	END Y-COORDINATE	SCREEN NAME
QUESTION 1	15	20	A
QUESTION 2	30	35	B

FIG. 19B

AN INPUT FIELD SCREEN DISPLAYING THE RECOGNIZED RESULTS ABOUT THE QUESTIONS DISPLAYED IN THE IMAGE DISPLAY AREA ON THE SCREEN IS DISPLAYED IN THE RECOGNIZED RESULT DISPLAY AREA, BASED ON THE TABLE.

DISPLAY EXAMPLE

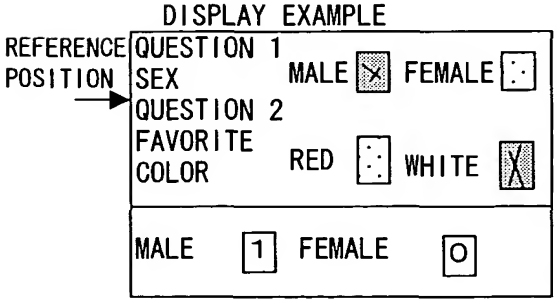


FIG. 19C

IN THE IMAGE IS SCROLLED DOWNWARD, SIMULTANEOUSLY, THE INPUT FIELD SCREEN IS SYNCHRONOUSLY SWITCHED.

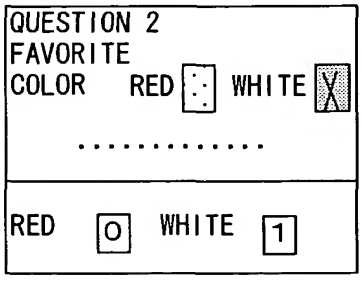


FIG. 19D

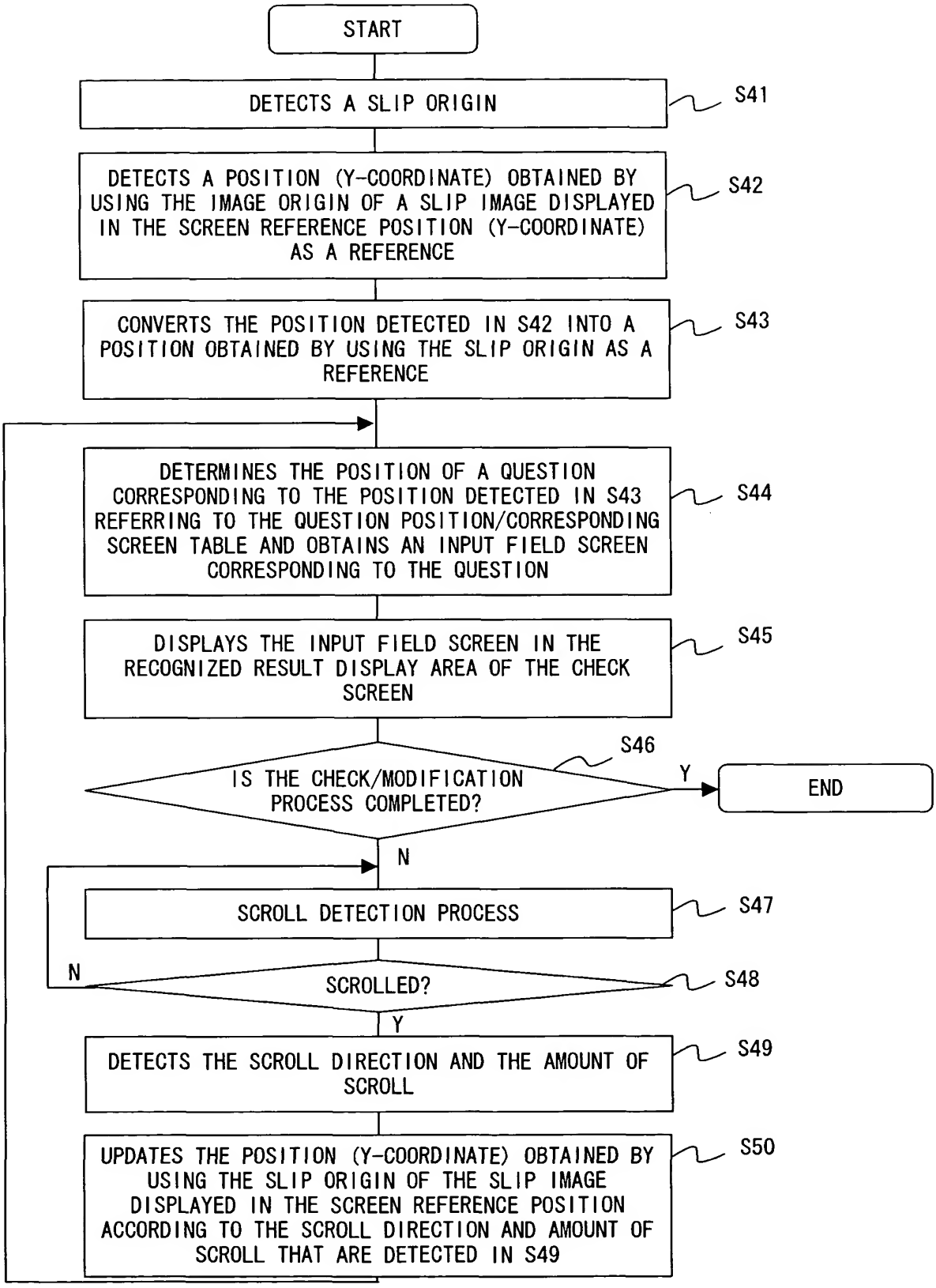
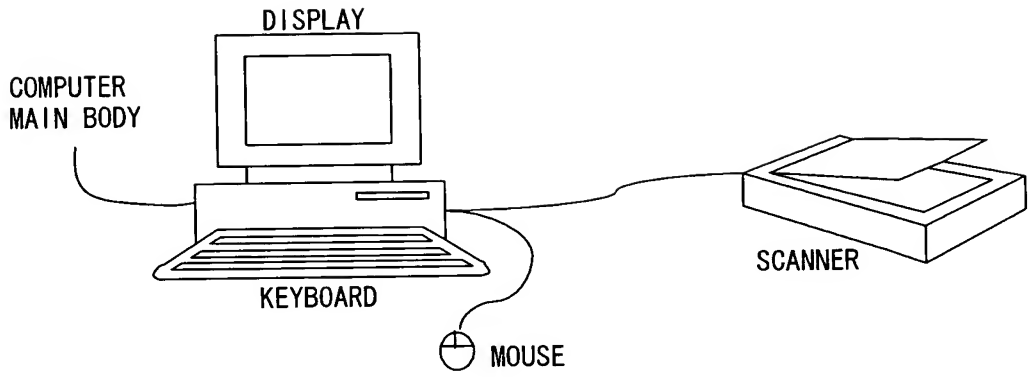

START
DETECTS A SLIP ORIGIN
S41
DETECTS A POSITION (Y-COORDINATE) OBTAINED BY USING THE IMAGE ORIGIN OF A SLIP IMAGE DISPLAYED IN THE SCREEN REFERENCE POSITION (Y-COORDINATE) AS A REFERENCE
S42
CONVERTS THE POSITION DETECTED IN S42 INTO A POSITION OBTAINED BY USING THE SLIP ORIGIN AS A REFERENCE
S43
DETERMINES THE POSITION OF A QUESTION CORRESPONDING TO THE POSITION DETECTED IN S43 REFERRING TO THE QUESTION POSITION/CORRESPONDING SCREEN TABLE AND OBTAINS AN INPUT FIELD SCREEN CORRESPONDING TO THE QUESTION
S44
DISPLAYS THE INPUT FIELD SCREEN IN THE RECOGNIZED RESULT DISPLAY AREA OF THE CHECK SCREEN
S45
IS THE CHECK/MODIFICATION PROCESS COMPLETED?
S46
Y
END
N
SCROLL DETECTION PROCESS
S47
N
SCROLLED?
S48
Y
DETECTS THE SCROLL DIRECTION AND THE AMOUNT OF SCROLL
S49
UPDATES THE POSITION (Y-COORDINATE) OBTAINED BY USING THE SLIP ORIGIN OF THE SLIP IMAGE DISPLAYED IN THE SCREEN REFERENCE POSITION ACCORDING TO THE SCROLL DIRECTION AND AMOUNT OF SCROLL THAT ARE DETECTED IN S49
S50

FIG. 20



SCANNER: INPUT DEVICE READING A SLIP IMAGE

FIG. 21

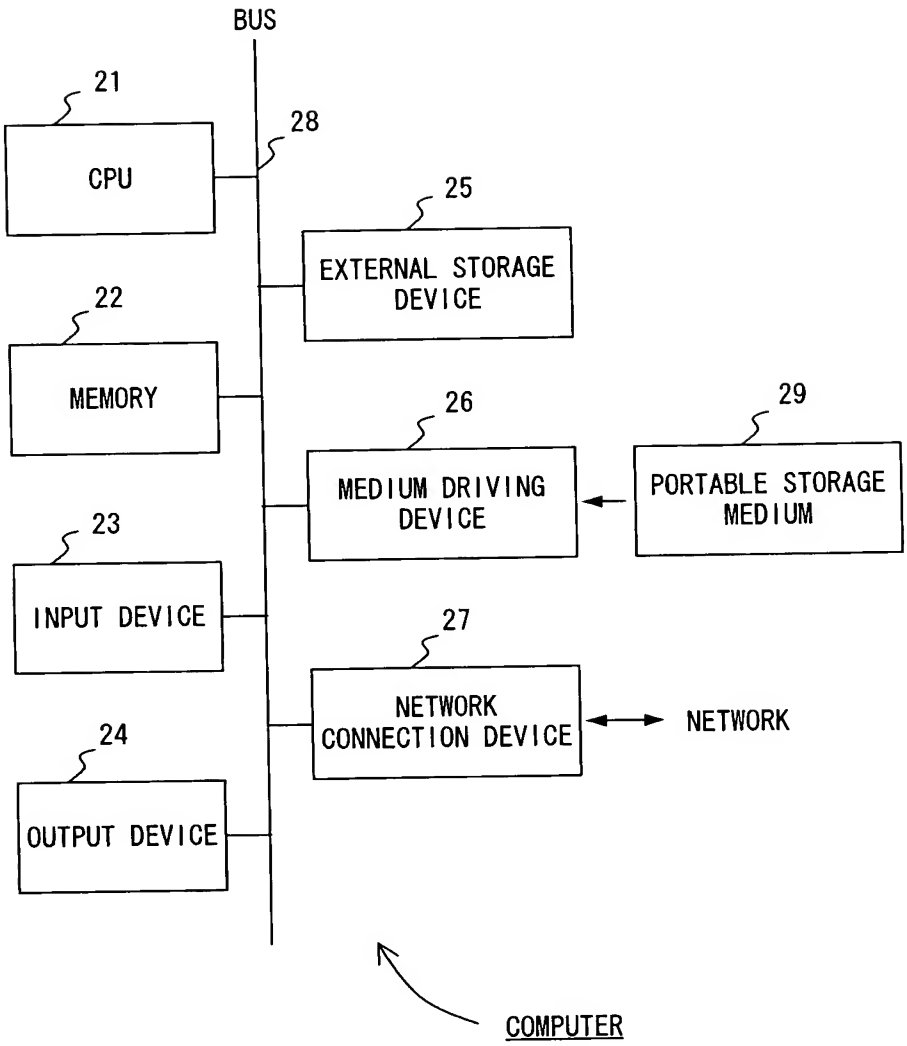

BUS
21
CPU
28
25
EXTERNAL STORAGE DEVICE
22
MEMORY
26
MEDIUM DRIVING DEVICE
29
PORTABLE STORAGE MEDIUM
23
INPUT DEVICE
27
NETWORK CONNECTION DEVICE
NETWORK
24
OUTPUT DEVICE
COMPUTER

FIG. 22

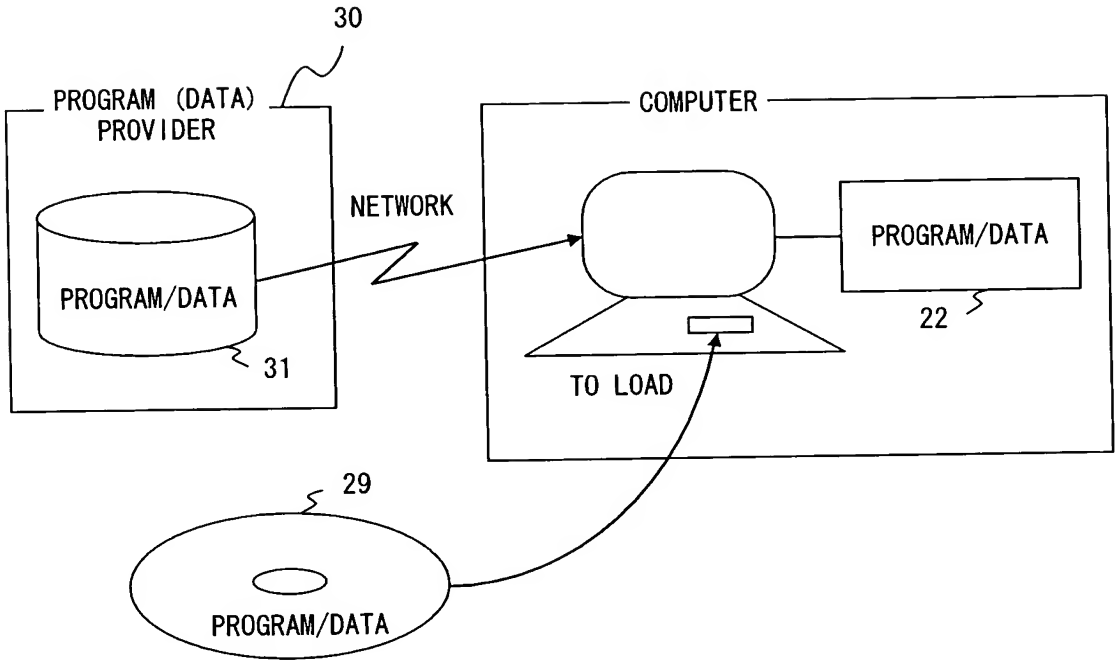

30
PROGRAM (DATA)
PROVIDER
PROGRAM/DATA
31
NETWORK
COMPUTER
PROGRAM/DATA
22
TO LOAD
29
PROGRAM/DATA

FIG. 23